

TABLE **XX** DATA QUALITY OBJECTIVES FOR SURFACE WATER AND SEDIMENT

STEP 1: State the Problem

Source of contamination: Waste from historical refining activities has migrated into environmental media. Based on the conceptual site model (CSM), surface water and sediment may have become exposure media at the site, as they are potentially impacted from migration of contamination from surface soil by runoff/erosion, from subsurface soil through seepage, and from ground water through seepage. There is also the potential for some of the surface water bodies to gain from or lose water to the ground water. Moreover, movement of contamination between surface water and sediment is possible through resuspension and sedimentation. These impacted media pose a possible risk to human and ecological receptors, as identified in the human health and ecological CSMs.

Contaminants of potential concern (COPCs): The COPCs for these media will be associated with the COPCs in the sources from which migration has occurred. The set of COPCs cannot be refined until source characterization has been completed. Conservatively, the site COPC list would apply to these media: volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), semivolatile organic compounds (SVOCs), target analyte list (TAL) metals, mercury, hexavalent chromium, cyanide, and dioxins/furans.

Currently, one surface water sample is available for evaluation; this sample was collected in December 2015 from the discharge of pond P1 and was analyzed for SVOCs, VOCs, and total and dissolved metals. (will add analytical detections here).

STEP 2: Identify the Goals of the Study

The following goals are established for surface water and sediment:

1. Assess if contamination is present in streams and ponds.
2. If contamination is present, assess its nature, extent, and volume.
3. Assess the hydrologic regime (permanent/temporary) for each water body.
4. Understand the interaction between ground water and surface water/sediment.
5. Assess the use of each water body to determine the risk exposure (for example, from eating fish, swimming, or direct contact) for the human and ecological receptors.
6. If contamination is confirmed based on the evaluation of analytical results of media samples versus upstream and reference samples, collect biota samples in the locations of highest contamination to assess impact
7. Screen if any of the current and future human and ecological receptors are at risk due to the contaminated surface water/sediment
8. If screening indicates that a possible risk exists, perform a risk assessment to confirm whether a threat is present or not.

STEP 3: Identify Information Inputs

Existing data for surface water and sediment will be reviewed prior to initiating data collection for the Remedial Investigation (RI); however, because the current data set for these media is not representative, the following data will be collected during the RI to provide input into the decision process:

1. Analytical results for surface water and sediment samples
2. Analytical results for upstream conditions and pond reference samples
3. Hydrogeological conditions, such as depth to permanent regional ground water and potentiometric maps (will be used to define the interaction with ground water)
4. Receptors use of surface water and receptors' exposure to sediment
5. Analytical results for biota samples
6. Federal and state standards applicable to surface water and sediment.

STEP 4: Define the Boundaries of the Study

The initial lateral boundaries of the study for surface water and sediment are as follows:

1. For permanent and intermittent streams, the points identified as upstream conditions and Confluence 1
2. The entire Northwest Tributary
3. Ponds P1 through P7; Pond P8 for reference conditions for permanent ponds; no samples are planned to be collected from Pond P9 at this time (of note, the surface water samples collected from the East Tributary at the exit from Pond P9 are considered to be representative of upstream conditions for the tributary)

The initial vertical boundaries of the study for surface water and sediment are as follows:

4. Depth of surface water samples is 0 – 1.0 ft below water surface.
5. Depth of sediment samples is 0.0 – 1.0 ft bgs, except those collected by the 8th Street bridge
6. Total depth of sediment samples collected from Sand Creek by the 8th bridge is 0.0-3.0 ft bgs; samples will be collected from 0.0-1.0 ft bgs, 1.0-2.0 ft bgs, and 2.0-3.0 ft bgs.

The temporal boundary is the timeframe of the RI.

For the lateral extent of investigation of the drainages from tank locations to Sand Creek, see the data quality objectives (DQOs) for soil, which will detail the approach for characterizing this medium.

Based on the results of the initial sampling, the lateral and vertical boundaries will be extended as indicated under Step 5 of these DQOs.

STEP 5: Develop the Analytic Approach

The analytic approach is defined for surface water/sediment as follows:

1. The following criteria will be used to determine if additional investigation of surface water/sediment is necessary:
 - a. For each contaminant in surface water or sediment collected from the streams, the greater of the (1) surface water/sediment criterion and (2) the concentration of the applicable upstream conditions
 - b. For each contaminant in surface water or sediment collected from the ponds, the greater of the (1) surface water/sediment criterion and (2) the concentration of the samples collected from the reference pond.

From here on, these criteria will be referred to as the “surface water criteria” and the “sediment criteria.”
2. Potentiometric surface map of ground water in the regional aquifer will be compared to the elevation of the surface water bodies to determine nature of hydraulic communication. For example, is Sand Creek gaining from or losing to regional water table, and are there seasonal fluctuations.
3. Structure contours of the top of sandstone/clay layer, upon which contamination from the surface and subsurface has migrated and pooled due to infiltration and horizontal seepage, will be compared to surface water body elevations to establish if contaminant seepage discharges to surface water/sediment.
4. Analytical results for surface/shallow soil samples collected along drainages (such as from Tank 34 to Sand Creek) will be evaluated to determine if the drainages and the former source areas are a continuing source of contamination to surface water/sediment. The samples for soil from the drainages are discussed under the soil DQOs.
5. Due to the timeframe of operation for the Wilcox Oil refinery, it is assumed that contaminant transport is fully developed. As such, media that are not presently contaminated are not anticipated to become so (i.e., no additional active primary releases, and steady-state to waning secondary releases). Consequently, if contaminant concentrations are below respective surface water or sediment criteria at a point of discharge, then the investigation at that location will be considered complete as the nature and extent of contamination is defined.
6. If the concentrations in surface water or sediment are greater than their respective surface water or sediment criteria, then:
 - a. Sources contributing to such contamination will be identified and the migration pathway between source and point of exceedance delineated.
 - b. If contamination in excess of either criteria is identified at Confluence 1, the lateral boundary of the investigation for the media in which the exceedance was recorded will be extended downstream in a phased approach, in increments of 1,000 ft, with each phase consisting of 10 additional sample locations (only the media in which contamination exceeded the criteria will be sampled within the extended boundary).
7. If an exceedance of the criteria is documented in sediment samples at a location, then the vertical boundary for sediment samples will be extended only at that location in 1 ft increments. One sample spanning the additional 1 ft interval will be collected.

STEP 6: Specify Performance or Acceptance Criteria

Qualitative and quantitative data will be collected.

1. Test methods will be selected such that the reporting limits are adequate for comparison of concentrations to the Federal and state screening levels.
2. Quality control samples will be collected during this phase of sampling to evaluate the usability of the analytical data for decision-making.

STEP 7: Develop the Detailed Plan for Obtaining Data

See write-up for the proposed approach; once approved by stakeholders, that information will be inserted here.